GAS ABSTRACTS

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GAS ABSTRACTS

GAS ABSTRACTS represents the inauguration of a new phase of service to the Gas Industry by the Institute of Gas Technology, the dissemination of information. GAS ABSTRACTS, which is published monthly, consists of abstracts of papers appearing in current technical journals in the field of gas technology and related subjects.

Scope of Selection: Articles, papers, and books, both theoretical and applied, pertaining to the manufacture, distribution or utilization of natural and manufactured gas will be considered. The periodicals listed on the last two pages will be read regularly. For the time being, only abstracts of those articles which are of immediate interest to our own staff, with a consideration of the interests of research and development men in the industry as a whole, will be considered.

Method of Abstracting: For the most part, the abstracting is done by the research staff of the Institute of Gas Technology. It is intended, in general, that the abstracts supply the technical man with sufficient information about the data contained in the paper to enable him to determine the desirability of reading the entire paper. For some articles which seem of unusual value a more detailed summary will be made.

Classification of Abstracts: The abstracts are grouped together in twelve subject groups and are arranged alphabetically by subject in each group. These subject groups and pages on which the abstracts appear are listed in the Table of Contents.

Format: The publication is prepared in such a manner that the abstracts can be cut and pasted on 5x8 cards for filing. We have considered publishing the abstracts in card form but for the present are unable to do so because of the added time and expense involved.

Annual Index: The preparation of such an index is being considered.

GAS ABSTRACTS (Cont'd)

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1. THE GAS INDUSTRY

GAS RESEARCH

GAS RESEARCH IN BRITAIN. *Petroleum* 8, 147-148, 1945 *(August)*.

The fifth annual report of the Gas Research Board, covering the year 1943-44, has recently been published. The report comprises 54 pages and has the following contents:

Officers and Council of the Gas Research Board; General; Third Annual General Meeting.

Report of the Director: General; Gasification of Coal with Hydrogen under Pressure; Synthesis of Methane, Removal of Organic Sulfur Compounds from Gases; Researches on Gas Utilization; Survey of Gas Quality; Organic Sulfur Compounds in Coal Gas; Heating and Drying by Radiation; Purification of Liquor Effluents; Separation of Gases by Refrigeration; Refractories; Work of the Research Fellows of the Institution of Gas Engineers; Miscellaneous; Publications.

Committee of Council, Accounts, and Staff.

GERMAN INDUSTRY

TECHNICAL ACHIEVEMENTS IN GERMANY REVEALED. *Industrial Gas* 24, 24, 1945 *(August)*.

Some of Germany's technical achievements discovered by the Technological and Industrial Intelligence Committee have been announced. Plans for disseminating this information are being drawn up. Developments of interest to the gas industry include: improved techniques for the production of synthetic petroleum products; hydrogenation plants operating at extremely high pressures; new catalysts permitting the Germans to convert oil to high octane gasoline more quickly than was known here; details on German refinements in the gas synthesis method of producing liquid fuels and lubricants from coal; and information on high temperature alloys unknown in the U.S.

GRAPHITE INDUSTRY

Pallister, H.D. ALABAMA FLAKE GRAPHITE IN WORLD WAR II. *Mining Technology* 9, 1945 *(July)*.

A shortage of foreign graphite gave rebirth to the domestic graphite industry which is confined principally to a small area in Alabama. This article gives the history of the Alabama graphite industry, its development and expansion since 1940, and its prospects for the future. A recovery process for graphite, with vanadium as a by-product, as developed by the Bureau of Mines is described in detail. A flow sheet is also included.

—T.J. Kenny

I. THE GAS INDUSTRY

HYDROGEN SULFIDE POISONING

Davenport, S.J. HYDROGEN SULFIDE POISONING AS A HAZARD IN THE PRODUCTION OF OIL. *Bureau Mines I.C. 7329, 1945 (July).*

Hydrogen sulfide is an extremely toxic gas; it is almost as toxic as hydrogen cyanide and five or six times as toxic as carbon monoxide. In low concentrations, irritation of the eyes particularly and of the respiratory tract are the minimum symptoms. Higher concentrations may result in respiratory failure. It is important to remove the victim to fresh air as quickly as possible, keep him at rest and prevent chilling. Artificial respiration should be applied if breathing has stopped. Inhalation of oxygen or a mixture of oxygen and carbon monoxide is of value and should supplement artificial respiration. The offensive odor of hydrogen sulfide is not a reliable indication of its presence because the sense of smell tires rapidly and cannot detect dangerous concentrations. Reliable methods of detection have been developed. The physiological response to various concentrations is summarized below:

Period of exposure	Parts H_2S per million parts of air
Maximum allowable concentration for prolonged exposure	20
Slight symptom after exposure of several hours	70-150
Maximum concentration that can be inhaled for 1 hr. without serious consequence	130-170
Dangerous after exposure of 30 min. to 1 hr.	400-700
Fatal in exposure of 30 min.	600

--C.H. Riesz

LITERATURE RESEARCH

Cook, S.J. LITERATURE RESEARCH AS A CHEMICAL TOOL. *Canadian Chemistry and Process Industries* 29, 526, 535, 1945 *(July).*

A brief statement of the desirability of cooperation between scientific literature searchers and research scientists by the Director of this work for the National Research Council of Canada. The skilled searcher of scientific literature acquires a facility comparable in value with the dexterity of his colleague in the laboratory. Together these two make a powerful team. It is suggested that scientists should receive specific library and literature search instructions some time in their last two years of undergraduate work.

--G.D. Creelman

I. THE GAS INDUSTRY

LP GAS INDUSTRY

LIQUEFIED PETROLEUM GAS INDUSTRY GROWING. *Oil Weekly* 119, 49, *1945 (September 10); Oil Gas J.* 44, 131, *1945 (September 15).*

Peacetime expansion of the liquefied petroleum gas industry is certain to have its impact on the petroleum industry. Almost immediately, household installations of liquefied petroleum gas are expected to be resumed at the rate of 500,000 annually. Future uses for liquefied petroleum gas include heating homes, sterilizing milk utensils, brooder heating, pasteurizing, running tractors, killing weeds, and heating orchards. In 1922 the U.S. Bureau of Mines reported 223,000 gallons were marketed. Twenty years later the total was 585,440,000 gallons. Household or domestic users were estimated to total 1,950,000, the last of December, 1944. They consumed 392,000,000 gallons during the year. One authority estimates 12½ per cent of the gas ranges in the United States are now operating on this fuel.

RESEARCH, MARKETING

Aires, R.S. MARKETING RESEARCH AND CHEMICAL INDUSTRY. *Canadian Chemistry and Process Industries* 29, *542-545, 1945 (August).*

Systematic study of markets by technically qualified people is emphasized in the outline of essential steps. A new and challenging field for chemists with the right bent and training is also revealed.

--Author's abstract

RESEARCH, STANDARD OIL

TWO PETROLEUM RESEARCH LABORATORIES ARE PLANNED BY STANDARD (NEW JERSEY). *Oil Weekly* 118, *62, 1945 (August 27); Oil Gas J.* 44, *47, 1945 (September 1).*

Standard Oil of New Jersey has announced plans for two new Research Laboratories for the Standard Oil Development Co. at Linden, New Jersey and Batan Rouge, Louisiana. An 8 million dollar program includes research on methods for "developing improved products from oil and processes for producing them, and extending sources of supply to oil products. This latter work will include production of oil from natural gas, gasification of coal, production of coal, production of oil from coal, and production of oil from other carbonaceous deposits such as oil shale."

--G.D. Creelman

2. APPLIANCES

BURNER FLAMES

Garside, J.E., Forsyth, J.S., and Townend, D.T.A. THE STABILITY OF BURNER FLAMES. *J. Inst. Fuel* 18, 175-186, *1945 (August)*.

The authors discuss the factors influencing the stability of both aerated and non-aerated flames.

OVEN DOORS

McCormick, F.H. (to General Motors Corp.) DOMESTIC APPLIANCE. *U.S. 2,378,421 June 19, 1945*.

This patent relates to the construction support and hinging of oven doors. Methods of counterbalancing oven doors and catches for oven doors are brought out.

--R.C. Gardner

RANGES

Cerny, J.A. AUTOMATIC OVEN PILOT ON POST-WAR RANGES. *Gas Age* 96, 50-51, *1945 (September 6)*.

The article describes the new Bryant automatic gas range pilot developed to meet the following requirements: fast and positive in action, rugged and dependable in construction, and readily adaptable to single-point flash ignition, electric ignition, and constant-burning pilot ignition.

REFRIGERATOR

Anderson, S.W.E. (to Servel, Inc.) REFRIGERATION. *U.S. 2,368,438 Jan. 30, 1945*.

A control valve for the burner of a refrigerator operated by both coil temperature and the air temperature in the refrigerator.

--R.C. Gardner

3. COAL AND GASIFICATION

ANTHRACITE

Barkley, J.F. and Seymour, W. WAR PROBLEM OF INCREASING UTILIZATION OF SMALL ANTHRACITE. *Mech. Eng.* 67, 457-462, *1945 (July).*

Four projects of the U.S. Bureau of Mines to develop uses for anthracite ranging in size from barley (No. 3 buckwheat) downward through the smaller sizes are discussed. These projects include: The burning of mixtures of small anthracite and bituminous slack in stokers; methods of producing and burning "packaged fuel" made from anthracite fines; the use of anthracite fines in the production of coke; the use of barley anthracite in gas producers.

COAL - BENEFICIATION

Mobley, W.M. SOME PHASES IN THE DEVELOPMENT OF COAL BENEFICATION METHODS IN ALABAMA. *Mining Technology* 9, *1945 (July).*

Production of a coal to conform to the strict requirements necessary for a good coking coal can best be accomplished by (1) selection of coal seams with as many as possible of the desired characteristics, (2) benefication of these coals to further improve the quality, (3) blending coals to compensate for differences from the ideal. Due to inherent characteristics of coal seams the problem evolves into individual studies. Studies of three different coal seams in Alabama are offered as examples of benefication methods used. Washability curves are included in each study.

--T.J. Kenny

COAL - CARBONIZATION

King, J.G., MacDougall, D., and Bardgett, H. THE EFFECT OF FREE SPACE IN THE CARBONIZATION OF COAL IN HORIZONTAL RETORTS. *Gas World* 123, *156-161, 1945 (August 18).*

The variation in gas yields can be attributed almost entirely to the increase of cracking space external to the charge. Increase of cracking space at the ends of the retorts is seen to cause a slight increase in the yield of gas. This increase is almost entirely due to an increase in the production of gaseous hydrocarbons, which may be presumed to be formed by the cracking of the heavier hydrocarbons of the tar vapors. The most effective cracking space in the retort is that over the charge since this space is not subject to cooling by radiation and convection as are the retort ends. Increase in gaseous thermal yield is due to alterations of the balance of the cracking reactions and need not necessarily involve a reduction of the tar yield. The effect of increasing the cracking space, by as much as 40%, is to increase the thermal yield of gas by 1.5 to 3.5 therms and to alter appreciably the composition of the tar produced, but not the net yield of tar. The work described in this paper was carried out by the British Fuel Research Board and is published by permission of the Department of Scientific and Industrial Research.

--L.H. MeEwen

3. COAL AND GASIFICATION

COAL - COKING

Lessing, R. THE BEHAVIOR OF THE CONSTITUTENTS OF BANDED BITUMINOUS COAL ON COKING. *Fuel* 24, 97-101, *1945 (July-August)*.

The differences in physical character of coke obtained from fusain, durain, clarain, and vitrain are distinctive. Fusain shows no outward change in appearance after coking. It has no tendency whatever to adhere and the solid coking residue is a powder. Durain undergoes practically no change of form during coking. The particles retain their angular shape and show little tendency to adhere to each other, although more than fusain. In general durain must be regarded as practically devoid of any "coking value." Clarain showed considerable fusion and merging of particles. The vitrain particles were well sintered and showed rounding of the angular edges, but the consolidation of particles did not go so far as with clarain.

COAL - GASIFICATION

King, J.G. THE COMPLETE GASIFICATION OF COAL: THERMAL CONSIDERATIONS. *Amer. Gas J.* 163, *16-20, 60, 1945 (September)*. This is a reprint in full of the article which appeared in *Gas Times* 42, *Suppl. V, 1945 (Mar. 3)* and *Gas World* 122, *220-226, 1945 (Mar. 10)*. The abstract given in *Gas Abstracts* 1, *No. 2, 4 (May)* is reprinted here.

The thermal efficiency of the various gas making processes is defined as the percentage which the thermal value of the products bears to the sum of the thermal values of the raw materials used and of the heat and power consumed. However, in discussing the various gasification processes used in Britain and in Germany, the thermal values of the by-products, such as tar, benzene, and phenols, are disregarded, and by "efficiency" is taken the per cent ratio of the thermal value of the gas produced to the total input as defined above. The thermal efficiency can best be increased by a study of the heat of the reactions involved, and potential and sensible heats of the products made. In a thermally efficient process it is necessary to keep the CO_2 formed to a minimum, to reduce radiation losses, and to return the sensible heat of the product to the system. Heat balances are given for various gasification processes. Critical analysis of these heat balances suggests methods of increasing the thermal efficiency of individual processes. The maximum efficiencies at present possible are, for producer gas 70.1%; carburetted water gas 64.5%; Tully process (blue gas generators connected in series, the up-run gases being passed downwards through the next generator) 56.6%; Lurgi process 62.2%; Winkler process 77%; Didier-Bubiag process 68.7%; Thysson-Galocsy process 90% (including recovery of tar).

--J.J. Sebastian

3. COAL AND GASIFICATION

COAL - GASIFICATION

Abramov, I. UNDERGROUND GASIFICATION OF COAL. *Gas World* 123, 130-132, 1945 *(August 11)*.

The concept of gasifying coal underground into a high-grade fuel which is then piped to the surface and delivered directly to the consumer was first propounded by the Russian chemist Mendeleyev. Several economic advantages are noted over the method of mining the coal and using it directly as a fuel, namely: (1) No need to dig out the coal or muck; (2) Control of supply of fuel is easier to accomplish; (3) No ash to remove; (4) The exact amount of air to burn the gas can be supplied; and (5) Labor and equipment involved is much less. The underground gasification of coal is based on the principle of a natural gas generator under the ground, converting high-ash, low-grade coals into gas, a clean and transportable fuel. Development work at an experimental station has shown that the cost of the gas so made is about two-fifths of an equivalent amount of coal. (Assumed that equivalent heating value is meant.). In industrial installations the cost would be considerably less.

--R.L. Husch

4. NATURAL GAS

CARBON BLACK

Gallie, J.F. CARBON BLACK IN ITS RELATIONSHIP TO THE NATURAL GAS INDUSTRY. *Gas Age* 96, 43-48, 80, *1945 (September 6); Gas* 21, 19-20, *1945 (September).*

A general discussion of the carbon black industry is given in which the role of natural gas is stressed. A general economic picture of the use of natural gas for production of carbon black is given. The industries forced migration to sources of cheap gas, by reason of pipeline competition, and the role of carbon black in gas conservation are pointed out with relation to the importance of carbon black in the manufacture of many essential products, especially rubber tires, both synthetic and natural. The importance of natural gas for synthesis is questioned in the light of its value for carbon black production.

--C.B. Folkrod

CHEMICALS

CHEMICALS FROM NATURAL GAS AT TEXAS PLANT OF CELANESE. *Chem. Met. Eng.* 52, 97, *1945 (August).*

At the new plant of the Celanese Corp. of America near Bishop, Texas, production of chemicals using natural gas as raw material is underway. The principal chemicals being produced or to be produced include acetic acid, acetic anhydride, acetone, methanol, formaldehyde, hexamine, and butadiene.

PRODUCTION RATES

Jones, P.J. THE OPTIMUM RATE OF PRODUCTION OF OIL, CONDENSATE, AND NATURAL GAS. I. ELEMENTS OF OPTIMUM PRODUCING RATES. *Oil Gas J.* 44, 50-52, *1945 (September 1).*

This series on the optimum rate of production deals with the obtainment of maximum recovery. Discussed are factors and features associated with maximum efficient and optimum rates of production. Most importantly, however, the "how" of doing it so as to obtain correspondingly the greatest profits is explained. The simplified mathematical relations involved, for convenience, are presented in easy-to-read charts. The work represents the most up-to-date material for utilization by production engineers.

--Author's abstract

SEPARATION

Barnes, K.B. PALOMA UNIT--AN ADVANCED OIL, GAS, AND PRODUCTS PRODUCING OPERATION. Part II. *Oil Gas J.* 44, 117-118, 121, 123, *1945 (August 25).*

Gas is separated from condensate at 2000, 800, 300, and 75 psi. Gas separated at 300 psi is compressed to 800 psi. Gases at 2000, 800, and 75 psi are treated in three absorbers at corresponding pressures. Residue gas from the 2000 and 800 psi absorbers is compressed to 4500 psi and returned to the formation. The 75 psi residue is used for fuel. Six 600 hp. angle machines are used in four compression stages, each

engine driving low, intermediate and high pressure compressors. Present production in barrels per day is condensate 5000, gasoline 1080, butanes 1000, and propane 500. In addition, excess liquid propane is in part returned to the formation by a pump and in part vaporized to provide air conditioning for plant offices and laboratories, the expanded gas being used for fuel.

--B. Miller

TEXAS INDUSTRY

Short, E.H., Jr. TEXAS CYCLING OPERATIONS INCREASE 15 FOLD DURING PAST SEVEN YEARS. *Oil Gas J.* 44, 120, 123-125, 127, *1945 (August 18)*.

A statistical summary of the cycling industry in Texas. Thirty plants now process over 2 billion cu. ft. per day from more than 350 producing wells and return 1,500,000,000 cu. ft. to the producing formation through more than 120 injection wells. Liquid products now average 50,000 barrels per day, including propane, butanes, gasoline, kerosene and heavier materials to gas oil.

--B. Miller

5. FUELS AND COMBUSTION

FURNACES

Neustaetter, K. OBSERVATIONS ON GAS FLOW AND COKE CONSUMPTION IN THE BLAST FURNACE. *Blast Furnace and Steel Plant* 33, 825-829, *1945 (July)*.

Since there are three functions of the coke in the blast furnace--to produce heat, to act as a reducing agent, and to provide voids to guarantee an orderely gas flow up through the stock column--the minimum coke consumption for the blast furnace process must be the minimum coke consumption required for the one of the three functions which requires the most coke. It vas shown that minimum coke consumption and maximum production are frequently determined, not by the efficiency of reduction of the ore, or by a good heat transfer, or a good gas-solid contact, but by an orderly gas flow controlled by the physical makeup of the stock. The most ingenious heat and coke saving device cannot work if it impairs an orderly gas flow.

GASOLINE, AVIATION

Kunkel, J.H. NEW SAFETY 100-OCTANE AVIATION FUEL. *Petroleum Engineer* 16, *172, 176, 1945 (August); Chem. Met. Eng.* 52, *137, 1945 (August)*.

A new type of safety 100-octane aviation fuel was disclosed by Standard Oil Development Co. The new fuel has a flash point of 105° F. as compared with -40° F. of regular 100-octane gasoline. The fuel has not come into general use because of its high cost and requirement for special fuel injection. The Navy has used it for testing fuel lines, fuel pumps and storage tanks on aircraft carriers so that leaks can be detected at a minimum of hazard. The new fuel is a product of the hydrogenation process.

--C.H. Riesz

GASOLINE, AVIATION

RUSSIANS GETTING ANTIKNOCK ELEMENT FROM TURPENTINE. *Oil Gas J.* 44, *123, 1945 (September 8)*.

An aviation gasoline constitutent "twice as efficient as isoctane" is being derived from turpentine in Russia. Turpentine is also employed as a motor fuel for trucks, tractors, and other motorized equipment in the lumber industry, although its principal function seems to be to start engines which operate on producer gas. Another product of research in wood chemistry is a lubricating oil made from wood-tar fractions. More than 100 commercial units to produce such lubricating oils were under construction in 1943 in Russia.

--Excerpt from article

GASOLINE, SYNTHETIC

Halpenny, L.C. GERMAN PLANTS EXTRACT GASOLINE FROM COAL. *Petroleum Engineer* 16, *188, 190, 192, 1945 (August)*.

The extraction of gasoline from brown coal at the Espenhain plant (near Leipzig) is described briefly. This plant completed in 1939 at a cost of

5. FUELS AND COMBUSTION

$100,000,000 used 9000 metric tons of coal per day (exclusive of that used in the power plant). The coal mined by a stripping operation contained 53% water. After pulverization and drying to a moisture content of 13%, the coal was briquetted and coked. Coke, gas and tar were recovered. The coke was burned for auxilliary heat and power. After tar, benzol and H_2S removal, the gas was used as a domestic and industrial fuel. The tar was hydrogenated to gasoline, diesel oil and paraffin.

--C.H. Riesz

OIL-SHALE RESOURCES

Kraemer, A.J. and Buchan, F.E. DEVELOPMENT OF OIL-SHALE RESOURCES UNDERTAKEN BY U.S. BUREAU OF MINES. *Chem. Eng. News* 23, 1523-1527, 1945 (September 10).

Increased consumption of petroleum has renewed an interest in the potential reserves of synthetic liquid fuels in the United States. This paper reviews the events leading up to passage of the Synthetic Liquid Fuels Act and outlines the Bureau of Mines program that deals with the development of the oil-shale resources of the nation.

--Author's abstract

6. PETROLEUM

EMULSIONS

Blair, C.M., Jr. PREVENTION AND TREATMENT OF PETROLEUM EMULSIONS. *Oil Gas J.* 44, 116-127, 1945 (July).

Theoretical considerations of petroleum emulsions which are of the water-in-oil type are given together with methods of resolving them. Stokes' law is applied to illustrate that sedimentation alone is not a satisfactory means of breaking these emulsions. No one method of demulsification can be regarded to be the best; however, resolution is usually accomplished by mechanical, electrical or chemical methods or combinations of these three. A short discussion of each is given. A bibliography is included.

--N.S. Schmitz

EMULSIONS

Mapstone, G.E. SHALE OIL EMULSIONS AND SLUDGES. *Petroleum Refiner* 24, 209-219, 1945 (June).

The problems of emulsion formation encountered in condensing oil vapors formed in the retorting of the torbanites of New South Wales are given. The emulsions formed are of the water-in-oil type. The article is divided into two main sections: (1) Factors which influence the formation and stabilization of these emulsions. Several qualitative tests were made and theories established. (2) Methods of treating the emulsions and sludges. The treatment was divided into three general classes: physical, mechanical, and chemical. The latter offered the best solution with the use of sulfuric acid as the demulsifying agent. A list of the special analytical methods used in the investigation has been prepared as an appendix.

--N.S. Schmitz

MIDDLE EAST PETROLEUM OPERATIONS

Willson, C.O. OPERATIONS RECENTLY RESUMED IN KUWAIT FOLLOWING TOTAL SHUTDOWN CAUSED BY WAR. *Oil Gas J.* 44, 96-98, 1945 (August 18).

This article--first of a series on the Middle East petroleum operations--is of great importance to the manufactured gas industry because of the bearing of such operations on the future price of oil. Nine wells with no dry holes have been completed in an area approximately 5 miles square. While extensive testing of the wells has not been possible, the usual mechanical tests point to large sustained production. E. De Golyer estimated proved and indicated reserves to be 9 billion barrels. It is expected that crude oil shipments will start early in 1946.

--B. Miller

6. PETROLEUM

PETROLEUM COKE

Berry, A.G.V. and Edgeworth-Johnstone,R. PETROLEUM COKE: PRODUCTION OF COMPACT NONPOROUS COKE. *Ind. Eng. Chem.* 37, 551-553, 1945 *(June)*.

Experiments are described in which mixtures of pulverized petroleum coke and residuum or cracked asphalt were subjected to secondary coking. For the production of strong nonporous coke under conditions of rapid heating, two requirements were found necessary: (1) The volatile content of the primary coke should exceed 7%. (2) The calculated volatile content of the mixture of coke and binder should not exceed 22%. These findings are interpreted in the light of a previous paper.

--Author's abstract

U.S. PETROLEUM INDUSTRY

U.S. PETROLEUM INDUSTRY HAD EDGE ON GERMANS IN CHEMICAL DEVELOPMENTS, ARMY REPORT SHOWS. *Natl. Petroleum News* 37, 40, 43, 1945 *(September 12)*.

A brief review of some of the findings of the Chemical Warfare Service in their investigation of German petroleum technology.

--G.D. Creelman

7. ANALYTICAL METHODS AND TESTS

CARBON AND HYDROGEN

Clark, R.O. and Stillson, G.H. MICRODETERMINATION OF CARBON AND HYDROGEN. *Ind. Eng. Chem., Anal. Ed.* 17, 520-522, 1945 (August).

As the result of considerable routine analyses and some experimental work, a series of observations on the microdetermination of carbon and hydrogen in organic compounds is presented and discussed in detail. The need for a preburner, the interpretation and correct use of blank determinations, combustion time, and the analysis of refractory compounds are covered.

--Author's abstract

CARBON AND HYDROGEN

Steyermark, A. MICRODETERMINATION OF CARBON AND HYDROGEN--A MODERN INDUSTRIAL SETUP. *Ind. Eng. Chem., Anal. Ed.* 17, 523-526, 1945 (August).

Balance table and balance mounting, illumination of balances, weather-proofing, air conditioning, and the laboratory plan of a modern industrial setup for the microdetermination of carbon and hydrogen are described. Experiences with absorption and combustion tubes are related. Data are given on the temperature of combustion and type of furnace used.

--Author's abstract

INFRA-RED ABSORPTION

Gordon, R.R. and Powell, H. QUANTITATIVE LIQUID PHASE HYDROCARBON ANALYSIS BY INFRA-RED ABSORPTION. *J. Inst. Petroleum* 31, 191-212, 1945 (July).

SPECTOMETRY

Brewer, A.K. and Dibeler, V.H. MASS SPECTROMETRIC ANALYSES OF HYDROCARBON AND GAS MIXTURES. *J. Research Natl. Bureau Standards* 35, 125-140, 1945 (August).

The basic principles underlying mass spectrometric analysis of hydrocarbons and gas mixtures are outlined. The method of calculating the composition from the mass-abundance records is described. Analyses of a number of hydrocarbon and other gas mixtures are shown. Whenever possible, comparisons with different methods of analyses are given. The reproducibility and the accuracy obtainable in mass spectrometric analyses are described.

--Author's abstract

8. GENERAL AND PHYSICAL CHEMISTRY

AMMONIUM SULFATE

Wethly, F. PRODUCTION OF AMMONIUM SULFATE FROM COKE OVEN GAS. *Blast Furnace & Steel Plant* 33, 976-980, *1945 (August)*.

BUTADIENE - THERMODYNAMIC PROPERTIES

Scott, R.B., Meyers, C.H., Rands, R.D., Jr., Brickwedde, F.G., and Bekkedahl, N. THERMODYNAMIC PROPERTIES OF 1, 3-BUTADIENE IN THE SOLID, LIQUID, AND VAPOR STATES. *J. Research Natl. Bureau Standards* 35, 39-86, *1945 (July)*.

This paper presents a detailed description of apparatus used and the results obtained in the following measurements relating to the thermodynamic properties of 1, 3-butadiene in the solid, liquid, and vapor states; (1) specific heats from -258° to 30° C., (2) heat of fusion, (3) heats of vaporization from -26° to 23° C., (4) vapor pressures from -78° to 110° C., (5) liquid densities from -78° to 95° C., (6) vapor densities from 30° to 150° C., and (7) the critical pressure, volume, and temperature of 1, 3-butadiene. Tables embodying the results of these measurements are included for specific heats, enthalpy, and entropy of the solid, liquid, and vapor.

--Author's abstract

HYDROCARBON-AIR MIXTURES

COMBUSTION PROPERTIES OF HYDROCARBON-AIR MIXTURES. *Gas Times* 44, 27-28, *1945 (September 1)*. Translated from *Gas- und Wasserfach* 87, 25 *(1944)* by B.M. Pearson.

From a study of the calorific value, density ratios, thermal loading (burner), region of explosive mixtures and speed of flame propagation of methane-air mixtures, it has been concluded that hydrocarbon-air mixtures with a high proportion of air approach town and coke oven gas in their collective combustion behavior.

9. ORGANIC CHEMISTRY

CATALYSTS

Bailie, J.C. and See, M.J. (to Standard Oil Co.) CATALYTIC HYDROCARBON CONVERSION PROCESS. *U.S. 2,378,530 June 19, 1945*

For the catalytic cracking of hydrocarbon oils, a catalyst is prepared by intimately mixing active silica with calcined magnesia. The catalyst is stabilized against deterioration at high temperatures by small amounts of uranium or tungsten oxides (an oxide of a metal of the left column of Group VI). A typical composition is 75% silica (by weight), 24% magnesia and 1% tungsten oxide.

--C.H. Riesz

CATALYSTS

Bentley, F.J.L. and Feachem, C.G.P. ALUMINA CATALYSTS FOR ORGANIC REACTIONS. *J. Soc. Chem. Ind.* 64, *148-149, 1945 (May).*

Gamma-alumina, which is the active species in alumina catalysts for reactions such as dehydrations, deaminations, etc., can be hydrated to boehmite with hot water (or with steam below about 150°). Alternate hydration and dehydration increases the activity, presumably by breaking up the crystal surface of the solid and increasing its area. If water is used, there is a washing action in addition and the effect is greater. An industrially useful catalyst can be made from an indifferently active starting material.

--Author's abstract

CATALYSTS

Lee, J.A. FLUID CATALYSTS MADE THEIR DEBUT IN CHEMICAL PRODUCTION. *Chem. Met. Eng.* 52, *100-101, 1945 (July).*

One of the most significant developments of recent years in the chemical industry is the application of fluid catalyst to the production of phthalic anhydride. Since its successful introduction into petroleum refining many organizations have been investigating means for adopting the technique to chemical processing. Sherwin-Williams is the first to achieve success. It is reasonable to believe that this pioneering venture is but the first of very many processes in which it will be used.

--Editor's abstract

CATALYSTS

Marisic, M.M. (to Socony-Vacuum Oil Co.). BEAD CATALYSTS. *U.S. 2,384,942-6, 2,385,217 September 18, 1945.*

These patents cover the method of manufacturing the "bead catalyst" which was developed for use in the TCC cracking units (cf. *Gas Abstracts* 1, *No. 4, 15 (July 1945)*. Extremely hard spheres of silica base gel are formed by dropping globules of a rapid-setting hydrogel into an oil bath maintained at such a density that the gel sets before it reaches the bottom of the vessel. The beads are washed and dried.

--G.D. Creelman

9. ORGANIC CHEMISTRY

CATALYSTS, HYDROGENATION

Eidus, Y.T. STUDY OF THE CATALYSTS FOR HYDROGENATION OF CARBON MONOXIDE BY JOINT APPLICATION OF DYNAMIC AND STATIC METHODS. Part II. A STUDY OF THE ACTIVITY OF CONTACTS COMPRISING THE COMPONENTS OF A COMPLEX Fe-Cu-ThO_2-K_2CO_3-KIESELGUHR CATALYST. *Bull. de l'Acad. des Sci. de l'U.R.S.S. Classes des Sciences Chimiques* 1944, 349-358. (In Russian with an English summary).

Twelve contacts comprising the components of the complex catalyst Fe-Cu-ThO_2-K_2CO_3-kieselguhr (100: 25:2:2:125) were investigated at 258° C by a method described previously (See *Gas Abstracts 1, No. 3, 8, June 1945*). Only those contacts which contain both iron and copper and one of the activators (ThO_2 or K_2CO_3) on a kieselguhr support possess any catalytic activity for the hydrogenation of carbon monoxide. Addition of the second activator increases the activity of the contact sharply. From the data it is postulated that the synthesis of hydrocarbons from carbon monoxide and hydrogen over iron catalysts proceeds through formation of carbides as an intermediate stage in distinction with cobalt and nickel contacts.

--C.H. Riesz

FISCHER - TROPSCH SYNTHESIS

Komarewsky, V.I. PRODUCTION OF SYNTHETIC LIQUID FUEL FROM NATURAL GAS. *Petroleum Engineer* 16, 202, 204, 206, 1945 (August); *Petroleum Refiner* 24, 170-176, 1945 (May).

A general review of the production of synthetic liquid fuels from natural gas by means of the Fischer-Tropsch process.

HYDROCARBONS, AROMATIC

Hansford, R.C., Myers, C.G., and Sachanen, A.N. CONVERSION OF AROMATICS. ALKYL GROUP TRANSFER IN THE PRESENCE OF SILICA-ALUMINA CATALYSTS, *Ind. Eng Chem.* 37, 671-675, 1945 (July).

The conversion of alkylaromatic hydrocarbons in the presence of a typical petroleum cracking catalyst under conditions similar to those encountered in commercial catalytic cracking and reforming operations has been studied. Xylene is converted to toluene and trimethylbenzenes by disproportionation of methyl groups. Trimethylbenzenes are converted to toluene, xylene, and polymethylbenzenes, and methylnaphthalene is converted to naphthalene and polymethylnaphthalenes by the same mechanism. Diethylbenzene is converted to ethylbenzene and ethylene; no triethylbenzenes are detected in the products. In the presence of benzene, alkyl groups from alkylbenzenes are transferred to this hydrocarbon with the formation of higher yields of monoalkylbenzene than in the disproportionation reaction. Methyl groups are not, however, transferred from methylnaphthalene to benzene.

--Author's abstract

9. ORGANIC CHEMISTRY

HYDROCARBONS - DEHYDROGENATION

Huppke, W.F. and Vermeulen, T. (to Union Oil Co.) CATALYTIC DEHYDROGENATION. *U.S. 2,379,081 June 26, 1945.*

Dehydrogenation of hydrocarbons by bubbling vapors through molten boric oxide containing a promoter.

--G.D. Creelman

HYDROCARBONS - HYDROGENATION

Carney, S.C. (to Phillips Petroleum Co.) ISOMERIZATION PROCESS. *U.S. 2,378,-685 June 19, 1945.*

A catalytic process for isomerizing normal butane to isobutane is claimed. The reactor employs the gas-lift principle to obtain agitation and recirculation. It is surmounted by a fractionating column which returns normal butane in a reflux stream to the reaction zone. Aluminum halide catalyst is promoted by hydrogen halide.

--C.H. Riesz

HYDROCARBONS - HYDROGENATION

Sheridan, J. THE METAL-CATALYZED REACTION BETWEEN ACETYLENE AND HYDROGEN. PART III. SOME EFFECTS OF ADDED SUBSTANCES ON THE REACTION OVER NICKEL. PART IV. REACTION OVER PLATINUM. *J. Chem. Soc. 1945, 301-305, 305-311 (May).*

Part III. The influence of various carriers on the nickel-catalyzed hydrogenation of acetylene was studied. In general, the carrier was of no influence on the reaction and only small differences in yields could be noted when the results were compared with those obtained with an earlier reported nickel-pumice catalyst. Kieselguhr, waterglass, activated alumina, vanadium oxide and chromium sesquioxide were used as carriers. No influence of carbon dioxide or nitrogen was detected. However, more than 3% nitric oxide retards the reaction. Oxygen also retards the reaction.

Part IV. Two reactions can be visualized in a reaction mixture of acetylene and hydrogen: (I) $C_2H_2 + H_2 \rightarrow C_2H_4 \rightarrow C_2H_6$ and (II) $C_2H_2 + H_2 \rightarrow$ products other than C_2 hydrocarbons. Both reactions are probably first order with respect to hydrogen and also their heats of activation are of about the same order, 12 kcal./mol. The reaction carried out in the presence of a platinum-pumice catalyst was investigated at a temperature range of 0-163° C. Lower temperatures enhanced the formation of ethane. Previously reported findings that acetylene is more strongly absorbed than ethylene were confirmed. Oxygen has little or no influence on the reaction.

--F. Lister

9. ORGANIC CHEMISTRY

HYDROCARBONS - ISOMERIZATION

Mason, R.B. (to Standard Oil Development Co.) PARAFFIN POLYMERIZATION PROCESS. *U.S. 2,378,782 June 19, 1945.*

Aluminum chloride is always entrained or dissolved in the hydrocarbon effluent from the isomerization reactor. It is proposed to heat this effluent to a higher temperature to use this dissolved catalyst to obtain further reaction. In one specification for the isomerization of normal butane, the reactor is maintained at 150° F, while the second zone is maintained at 250° F.

--C.H. Riesz

HYDROCARBONS - ISOMERIZATION

Roach, W.W. (to Phillips Petroleum Co.) ISOMERIZATION OF HYDROCARBONS. *U.S. 2,378,728 June 19, 1945.*

For the liquid-phase, catalytic isomerization of saturated hydrocarbons, a reactor employing the gas lift principle is claimed. The design is similar to a coffee percolator. Heat applied to the liquid at the bottom of the reactor causes vapors to rise in a central tube and cooling applied at the top causes liquid to pass down over solid aluminum halide catalyst in an annular space. The isomerized product is withdrawn at the bottom, passed to a fractionator, the isomerization product removed and recycle, fresh feed and hydrogen halide are added to the top of the reactor.

--C.H. Riesz

HYDROCARBONS - ISOMERIZATION

Sensel, E.E. (to The Texas Co.) CATALYTIC CONVERSION OF HYDROCARBONS. *U.S. 2,378,733 June 19, 1945.*

In a process for isomerizing hydrocarbons, the hydrocarbon charge is contacted with aluminum halide-hydrocarbon complex at conditions such that aluminum halide is dissolved. The stripped complex produced is contacted with the products from a reactor to remove aluminum halide and hydrogen halide therefrom. This enriched material is used to treat more fresh hydrocarbon feed.

--C.H. Riesz

HYDROCARBONS - OXIDATION

Stossel, E. OXIDATION OF PARAFFINS. *Oil Gas J.* 44, *130-139 (July 21); 145-151 (August 18); 69-77, 1945 (September 1).*

The oxidation of paraffin waxes for the production of fatty acids and other oxygenated products is discussed. Catalysts and control of temperature are very important for high conversions of desired products. The fatty acids produced contain odd as well as even carbon atoms in the molecule in distinction with natural products. Only about 25-30% of the product is recovered as acids. The remainder is unattacked hydrocarbons as well as other oxidation products, e.g. alcohols, aldehydes, ketones,

and hydroxy acids. Separation, purification and uses of the various products are described. Much of Germany's synthetic fatty acids and fats was produced by oxidation of slack wax obtained in the Fischer-Tropsch process. Recent German developments in the subject are reviewed. The use of petroleum wax by-products as an economic source material is considered. A total of 121 references is included.

--C.H. Riesz

HYDROCARBONS - POLYMERIZATION

Kunkel, J.H. BAYWAY UNIT HOLDS U.S. POLYMER MAKE RECORD. *Petroleum Engineer* 16, 76, 79-80, 82, *1945 (August)*.

The Bayway polymerization plant completed three and one-half years of continuous operation on April 30, 1945, and is still on-stream. As a result, the plant has made more polymer than any other U.S. refinery. Feed to the unit is 8000 gallons per hour of a 98-99% C_4-fraction which contains 40% unsaturates. Operation features of the plant are described.

--C.H. Riesz

10. DEVELOPMENT ENGINEERING

AIR CONDITIONING

Warson, G.H. AIR CONDITIONING CRAWFORD LONG HOSPITAL. *Southern Power & Industry* 63, 72-73, 120, 1945 (July).

Six different air conditioning systems serve the modern Crawford W. Long Memorial Hospital, Atlanta, Georgia. Two 60-ton Carrier compressors, using freon, comprise the cooling plant; two 150 h.p. gas fired, steam boilers supply the heat. Heating or cooling the air to individual rooms or areas is accomplished by water coils, thermostatically controlled. Thorough filtering of all air, automatic humidity control, and ample make-up air are other desirable features of the system.

--M.F. Knoy

CORROSION

Corfield, G. CORROSION AND PROTECTION OF BURIED METALLIC STRUCTURES. LOCATING AND SPACING GALVANIC ANODES. *Gas* 21, 45-46, 1945 (August).

The locating and spacing of galvanic anodes is determined by locating the areas of high chemical content in which the anodes may be installed; their proper spacing is determined by the resistance of the respective current paths involved. The relative degree of chemical concentration and the areas of high chemical content in the soil are determined by resistivity measurements and plotting of the equi-resistivity contour lines.

--V. de Marchi

CORROSION

Reid, W.T., Corey, R.C., and Cross, B.J. EXTERNAL CORROSION OF FURNACE-WALL TUBES. I. HISTORY AND OCCURENCE. *Trans. Am. Soc. Mech. Engrs.* 67, 279-288, 1945.

External corrosion of furnace-wall tubes has been found in many slag-tap boiler furnaces fired with pulverized coal. Inspection of 16 furnaces showed tube metal temperatures did not exceed 900° F. and may be lower in the corrosion areas than in adjacent uncorroded areas. Active corrosion usually occurred where the furnace gas contained considerable CO while SO_2 was not appreciable. Two main types of deposits were found, usually separately but sometimes together. In 75% of the cases, the deposit was mainly Na_2SO_4 and K_2SO_4, usually green blue, and strongly resembled a porcelain enamel. It is believed the slag did not react directly with the tube metal or its oxide coating even though the corrosion usually occurred under a slag layer. The corrosion could be arrested by prevention of reducing conditions at the surface of the tubes.

C.A. 39, 3512, 1945 (August 20)

10. DEVELOPMENT ENGINEERING

CORROSION PREVENTION

Griffin, A.E. CHLORINE TAKES THE BITE OUT OF AMMONIA. *Power* 89, 458-459, 489b, 489c, 1945 (July).

Ammonia is present in water as (1) free ammonia, most troublesome because it easily passes along with steam and concentrates in the condensate causing severe corrosion in piping and strain cracking in brass, and (2) albuminoid ammonia. Tests show that, when properly applied, chlorine destroys ammonia. Free available chlorine residuals can be obtained without intensifying tastes and odors and such residuals kill practically all kinds of bacteria in less than 3 minutes. Free ammonia and residual chlorine do not exist in the same solution.

--V. de Marchi

DUST, ATMOSPHERIC

Stern, A.C. ATMOSPHERIC POLLUTION DUE TO DUST AND CINDERS. *Heating & Ventilating* 42, 85-88, 1945 (July).

Atmospheric dust arises from natural processes of disintegration and attrition as well as the discharge of stacks and chimneys. The term pollution should be reserved for dust from the latter source. Dust sampling methods include filtration, wet impingement, electric precipitation and the Owens jet dust counter. Soot fall may be measured by means of properly arranged settling receptacles. Methods of making pollution surveys are briefly discussed, and representative figures for several cities are given. Dust and cinder pollution abatement measures are briefly considered.

--M.A. Fisher

HEATING - IMMERSION

Dewey, M.J. IMMERSION TUBE HEATING WITH GAS. *Gas* 21, 47-48, 1945 (August).

This article gives a general picture of what is being done with immersion heating.

--R.C. Gardner

HEATING - RADIANT

Cain, J. RADIANT HEATING. *Southern Power & Industry* 63, 58-61, 1945 (September).

Room surfaces warmed by pipes in floors and walls radiate directly to the objects within the room without appreciably raising the room temperature.

--Author's abstract

10. DEVELOPMENT ENGINEERING

HEATING - RADIANT

Tiller, F.M. RADIANT HEATING. *Chem. Products* 8, 35-40, 1945.

A discussion of principles of radiant heating and of industrial utilization (metal heating, localized heating, vaporization processes, radiation used as auxiliary heat and miscellaneous processes). 20 references.
C.A. 39, 3182, 1945 (August 10)

HYDROGEN - PRODUCTION

Hutchinson, W.K. THEORY AND PRACTICE OF HYDROGEN PRODUCTION BY THE STEAM-IRON PROCESS. *Gas World* 123, 105-114, 1945 *(August)*.

Investigation of process variables of hydrogen production based on the steam-iron reaction showed close correlation between theory and practice. The plants described consist of (1) preheater for the reducing gases, (2) a cast iron retort containing a bed of very porous, active iron ore, and (3) a regenerator for the burning of spent reducing gases. The equilibria between the various iron oxides in the ore bed, neglecting complications of mixtures of oxides, are as follows:

(a) First stage of reduction: $Fe_3O_4 + H_2 \leftrightarrows 3FeO + H_2O$
and $Fe_3O_4 + CO \leftrightarrows 3FeO + CO_2$

(b) Second stage of reduction: $FeO + H_2 \leftrightarrows Fe + H_2O$
and $FeO + CO \leftrightarrows Fe + CO_2$

A plot of the equilibrium constants of these reactions vs. the temperature resulting in a phase diagram for Fe, FeO, and Fe_3O_4 is included. Knowing the composition of ore bed, the ratio of hydrogen to steam in the gas mixture, the volume of hydrogen produced for a certain stage of reduction, the quantity of reducing gas for regeneration and the composition of spent reducing gas may be predicted from the equilibrium constants. These predictions proved to be in close agreement with results obtained in actual practice. For greatest steam economy the composition of ore bed should remain within the Fe-FeO stages, whereas for greatest economy in the use of reducing gas the composition should be between the Fe_3O_4 - FeO phases. For maximum thermal efficiency a balance must be attained between the duration of cycle and the stage of reduction of the ore bed. The plant capacity is a function of the steam-hydrogen ratio, size distribution and reactivity of ore bed. Operating results, gas analyses and heat balances are given, together with the results of fuel scale tests and cost analysis for continuous hydrogen production.
--C.V. Fredersdorff

INJECTORS

McElroy, G.E. THE ROLE OF AIR JETS IN MINE VENTILATION. *Mining Technology* 9, *1945 (July)*.

The object of this article is to discuss some of the ways in which air jets are involved in mine ventilation and other similar enclosures. To date jets and injectors occupy only a minor role in mine ventilation but

particular characteristics makes them applicable to special conditions and special jobs. A recent innovation mentioned is that of ventilating an enclosure without ducts and with all ventilation openings on one wall. Injectors have special application to tunnels and can be used to regulate split flow in coal mines in a way that conserves some of the energy now lost at regulators. Attention is called to the pressure change in a diverging discharge to the atmosphere as a means of securing pressure and exhaust in close juxtaposition. Available data on the discharge of jets into large openings and on the design and performance of air injectors has been analyzed in considerable detail.

--T.J. Kenny

METALS

Siegfried, W. BRITTLENESS AND DUCTILITY OF METALS AT HIGH TEMPERATURES. *Engineers' Digest* 2, 391-396, *1945 (August)*. From *Technische Rundschau Sulzer 1945, No. 1, 43-79.*

Tests on a 94% tin, 6% cadmium alloy at room temperature show that this alloy acts similarly to low alloy steels at high temperatures. Two low alloy steels, 0.12 C-30 Ni-15 Cr steel containing additions of tungsten, molybdenum and titanium and another steel with 0.2 C-16 Cr-12 Ni, were stressed at high temperatures and the mechanism of creep was found to be qualitatively the same as the tin-cadmium alloy. The embrittlement may be accelerated by increasing the triaxial strength by putting stress on notched alloy bar.

--S. Mori

PETROLEUM REFINING

Pew, A.E., Jr. THE USE OF GAS TURBINES IN SUN OIL REFINERIES. *Natl. Petroleum News, Tech. Sect.* 37, *R-635-640, 1945 (August 1).*

The principal industrial use of gas turbines to the present date has been in connection with the supplying of large volumes of compressed air for regenerating the catalyst in the Houdry oil refining process. If air were used at atmospheric pressure, the volume of the catalyst chambers would be entirely too large for any practical application. If, on the other hand, it were necessary to supply prime power to the air compressor, the process would also be too expensive. By combining the gas turbine, which extracts energy from the spent gas, with the compressor, not only can the necessary air be supplied, but additional power can also be obtained, sufficient in many cases to supply most of the auxiliary power requirements of the unit. The author discusses the results which have been obtained from many gas turbines of both Swiss and American manufacture in this rather exacting service, and concludes that the reliability of the gas turbine compressor set has been adequately demonstrated. The most recently acquired unit has operated for more than 600 days without being taken off the line.

--J.I. Yellott

10. DEVELOPMENT ENGINEERING

REFRIGERATION

Edgerg, P. (to Servel, Inc.) REFRIGERATION. *U.S. 2,368, 455 Jan. 30, 1945.*

A method of dividing a liquid into multiple streams of any relative quantities. The liquid must be under such conditions that some vaporization will take place in the dividing tubes. The main resistance to flow is the resistance to the flow of the vapor that is formed in the tube; resistance to flow of the liquid would be extremely slight in the size of the tube used. For equal flow the two tubes have to be only approximately the same.

--R.C. Gardner

REGENERATORS - CLEANING

Phillipson, G.A. CLEANING COKE-OVEN REGENERATORS. *Coke and Smokeless Fuel Age 7, 148-152, 154, 1945 (August).*

The author describes a method which he has devised of cleaning regenerators fouled by dust deposited by blast-furnace gas.

II. CHEMICAL ENGINEERING

AIR-LIFT

Shaw, S.F. AIR-LIFT RESEARCH PROJECT OF THE A&M COLLEGE OF TEXAS. *Petroleum Engineer* 16, 105-110, 1945 *(August)*.

Pipes up to 2-½ in. in diameter and 80 ft. in length were used in air-lift studies. Oil and water were pumped at submergences varying from 10-74%. In general, an increased submergence gave a greater output for a given quantity of compressed air. Also, for a given per cent submergence, capacity is usually increased as the length of the pipe is increased. More complete data are to be published in a bulletin of the Engineering Experiment Station.

--J.D. Parent

AIR RECIRCULATION

Victor, V.P. AIR RECIRCULATION IN DRYING OF UNBOUND MOISTURE. *Chem. Met. Eng.* 52, 105-109, 1945 *(July)*.

The least amount of water which a material can contain and still possess a vapor pressure identical with that of pure water at the stated temperature is called the "bound" moisture. The difference between the total moisture content and the bound moisture is called the "unbound" moisture. It is pointed out that removal of unbound moisture may often be unduly retarded by poor contact between the air and the material to be dried or by improper drying conditions. Means of removing liberated moisture from the air stream used in a drying chamber are related. Air recirculation is discussed in some detail, and two charts useful in design for convective drying are given. It is recommended that recirculation be examined from the point of view of heat economy and a ability to pick up moisture. Rules are given for air temperatures above and below 260° F.

--J.D. Parent

DISTILLATION

Colburn, A.P. and Schoenborn, E.M. THE SELECTION OF "SEPARATING AGENTS" FOR AZEOTROPIC AND EXTRACTIVE DISTILLATION AND FOR LIQUID-LIQUID EXTRACTION. *Trans. Am. Inst. Chemical Engineers* 41, 421-443, 1945 *(August 25)*.

DISTILLATION

Gerster, J.A., Koffolt, J H., Withrow, J.R. RELATIONSHIP BETWEEN HEIGHT OF TRANSFER UNIT AND THEORETICAL PLATE METHODS IN COLUMN DISTILLATION CORRELATIONS. *Trans. Am. Inst. Chemical Engineers* 41, 393-419, 1945 *(August 25)*.

II. CHEMICAL ENGINEERING

DISTILLATION

White, R.R. CALCULATION OF PLATE COLUMNS FOR BINARY DISTILLATION BY THE PONCHON METHOD. *Petroleum Refiner* 24, 299-302, 1945 *(August)*.

Several assumptions are made in the usual graphical methods for calculating the number of perfect plates required to make a given separation by distillation under fixed operating conditions. Ponchon proposed a graphical method which requires the use of an isobaric enthaply vs. concentration chart (now known as a Merkel chart). While this method eliminates the necessity of the assumption of constant molal overflow, it is based on perfectly adiabatic (no heat losses) operation. Professor White presents the theory of this method, although this has been done many times before. He introduces the concept of addition and subtraction points which, he feels, eliminates the necessity for involved algebraic manipulation. Some examples are given which include multiple products, plate efficiency, open steam and side stream re-circulation.

--J.D. Parent

GAS FLOW

Wilke, C.R. and Hougen, O.A. MASS TRANSFER IN THE FLOW OF GASES THROUGH GRANULAR SOLIDS EXTENDED TO LOW MODIFIED REYNOLDS NUMBERS. *Trans. Am. Inst. Chemical Engineers* 41, 445-451, 1945 *(August 25)*.

Experimental data on the transfer of water vapor from air flowing through granular solids were obtained in the range of modified Reynolds numbers from 50 to 250. Seven different particle sizes were used.

--Author's abstract

12. APPARATUS AND EQUIPMENT

COMPRESSORS

Duffendach, P.E. THE PORTABLE GAS COMPRESSOR. *Gas* 21, 27-28, *1945 (September).*

Portable gas compressor units are proving useful and economical in the conservation of existing gas reserves. Their principal uses are: (1) To enable the marketing of gas from low pressure areas. (2) To expedite the recovery of shallow gas to provide fuel for deeper drilling. (3) To assist in maintaining delivery ability to meet peak requirements. During low delivery requirements periods these units can be used to pump gas produced from one area or a group of wells to a point of storage. (4) To replace large compressor equipment. The cost of installation of portable compressors is relatively small and operating expenses are moderate.

--Author's abstract

COOLING TOWER

McCue, J.H. COOLING ELEMENT. *U.S. 2,378,645 June 19, 1945.*

A cooling tower adaptable for uses such as in the air supply of a room or to supply cooling water to a small apparatus. The tower is constructed so that the cooling liquid must flow back and forth horizontally in its downward flow through the tower.

--R.C. Gardner

METER DIAPHRAGMS

Van Der Pyl, L.M. and Werder, M.H. DEVELOPMENTS IN DIAPHRAGM DRESSINGS. *Amer. Gas Assoc. Monthly* 27, *384-385, 1945 (September).*

Reports of comparative tests on the relative effectiveness of a number of new materials used for gas meter diaphragms.

--Author's abstract

PUMP

Bottcher, R. (vested in the Alien Property Custodian) THERMAL PUMP. *U.S. 2,368,101 Jan. 30, 1945.*

A heat operated pump consisting of a sylphon-like body forming an internal working chamber all being enclosed in another chamber containing a working fluid and a displacer member. The upper part of the outer chamber is heated and a lower portion cooled by air or other means. The displacer member is connected to the bellow by a tripping lever and spring system. The level of the working fluid is raised and lowered by the displacer member to the heated and cooled portion of the outer chamber where it is vaporized and condensed.

--R.C. Gardner

12. APPARATUS AND EQUIPMENT

SEPARATOR

Schneible, C.B. SEPARATION OF SOLIDS IN A MEDIUM. *U.S. 2,368,263 Jan. 30, 1945.*

A separator is described for the removal of suspended solids from hot gases. The apparatus consists of two parts. In the first part, the gases are pulled by suction through a "refuser" wheel which is rotated by a motor. The "refuser" wheel somewhat resembles a centrifugal air blower with end plates on the rotating vanes, and the gases are pulled through in a direction opposite to the normal path of gas through an air blower so that part of the suspended solids are thrown outward, while the cleaned hot gas is withdrawn around the shaft of the "refuser" wheel. The solids and a part of the hot gas then pass on to a filter apparatus where they are cooled by the addition of cold gases and then filtered in a standard manner.

--M.A. Fisher

13. NEW BOOKS

Lowry, H.H. (Editor) CHEMISTRY OF COAL UTILIZATION. 2 vols. *New York, John Wiley & Sons, 1945.*

A comprehensive critical review of the literature on the chemistry of coal utilization prepared by 35 authorities on the subject. A complete index to all books and monographs referred to in the text is included.

Mantell, C.L. and Hardy, C. CALCIUM METALLURGY AND TECHNOLOGY. A.C.S. Monograph, *New York, Reinhold Publishing Corp., 1945.*

Seeley, F.B. RESISTANCE OF MATERIALS. 2nd edition. *New York, John Wiley & Sons, 1944.*

This is a well written elementary text and should be an excellent introduction to engineering design. Topics covered include the strength of cylinders and spheres, stresses and deflections of beams, columns, fatigue of metals, and torsion problems.

--J.D. Parent

Taggart, A.F. HANDBOOK OF MINERAL DRESSING--ORES AND INDUSTRIAL MINERALS. *New York, John Wiley & Sons, 1945.*

The new edition has been rewritten, a new chapter on Cement has been added and the chapters on Theoretical and Applied Mechanics and on Physics have been omitted. The other chapters have been rewritten, rearranged, enlarged, and brought up to date.

--V. de Marchi

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List of Periodicals Received

A.A.A.S. BULLETIN
ALLIS CHALMERS ELECTRICAL REVIEW
AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS: BULLETIN
AMERICAN CHEMICAL SOCIETY: JOURNAL
AMERICAN GAS ASSOCIATION: MONTHLY
AMERICAN GAS JOURNAL
AMERICAN INSTITUTE OF CHEMICAL ENGINEERS: TRANSACTIONS
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